SCIENCE.

FRIDAY, NOVEMBER 13, 1885.

COMMENT AND CRITICISM.

THE NATIONAL ACADEMY OF SCIENCES is holding its autumn session at Albany as we go to press. The number of papers read at these autumn gatherings, which are held now in this city, now in that, is never so great as at the spring meetings held in Washington; but the quality if not the quantity of papers is apt to be equally good, since the session is called, except for specific reasons, for this purpose only. The session at Albany would seem to be no exception to the ordinary rule, and, although there is but a single member of the academy resident in the city, — the veteran geologist, Prof. James Hall, — the attendance has not been insignificant, nor the meeting lacking in good points. Besides the usual papers of only technical importance, there have been a number of very general interest, prominent among which are those of Prof. E. C. Pickering, opening what may fairly be looked on as a new and promising field in astronomy, that of stellar photography; the paper of Prof. S. P. Langley on obscure heat, a continuation of his remarkable researches with the bolometer; that of Dr. Graham Bell, recounting the first fruits of his investigation into the influence of heredity in deafness; and that of Prof. Simon Newcomb, discussing the vexed question at what hour the astronomical day shall begin. In our next issue we hope to present an account of the entire meeting.

THE REPLY of Director Powell, which we publish in another column, to the newspaper attacks on the geological survey, will strike the fair-minded reader by its conclusiveness. It is true that the prosecution, if there were any, would still have the right to prove its allegations by rebutting evidence; but the very fact that the reply of the defence is couched in such terms as to make it easy to do this, renders it doubtful whether any such evidence will be forthcoming. The director does not enter into any long explanations, requiring an exhaustive inquiry into their validity, but in all the important cases interposes a direct denial that the allegations have any foundation. The issue is thus brought down to one of easily ascertained facts, which it would be impossible for the director to pervert without speedy exposure. For example, it was distinctly charged that he had paid salaries as high as $4,000 per year to state geologists. He replies that the name of every geologist employed by the survey is a matter of published record, and challenges the accuser to show that any one of them is a state geologist. For more reasons than appear on the surface, our government science is to be congratulated on the completeness of the defence.

The case has some peculiarities, which render it noteworthy that the director should have been able to vindicate himself so completely, in the face of such an attack. Rarely has a government officer been intrusted with so large an annual expenditure, so completely at his own discretion, as the officer in question. The organization, under which the work was to be done, was largely his own creation, and the funds had to be expended in distant parts of the country, through agencies not in personal contact with the supreme power. Just as the system has been got well into operation, searching investigation is commenced. The disaster which overtakes a sister institution, when exposed to such scrutiny, leads to the confident expectation that this one may also be found wanting in some point, when searched by eagle eyes. That some errors in detail would be found, might almost be taken as a matter of course, and in such a case the extraordinary character of the circumstances might have been plead as a valid excuse for many such errors. And yet the latest report is that the vigilant first auditor has found no fault in the legality of any of the expenditures of the bureau, and finds all the accounts in good shape.

THE CASES OF POISONING at Momence, Ill., recorded at length in a report just issued by the board of health of that state, are of great interest as bringing to light a source of danger hitherto but little regarded. In the course of the investigation it was found that the thirty-seven individuals affected had all eaten of dried beef purchased from the same butcher; of the number seized with the symptoms of poisoning, but one died. Although

trichinae, or some other form of parasite, was at first suspected, the microscope gave no clew to the cause of the sickness. Chemical search for the ordinary mineral and vegetable poisons was also fruitless, but further examination left no doubt in the mind of the investigators that ptomaines were responsible for the trouble. Ptomaines derive their name from *ptoma* ('a corpse'), and were so called because first discovered in a corpse. Selmi, in 1870, while examining the body of a man who was supposed to have been poisoned, found an alkaloid totally unlike any which had been described. Gautier and others, working on the same problem, have demonstrated that, during putrefaction, certain substances are formed, variously described as 'ptomaines' and 'cadaveric alkaloids,' which are peculiar in themselves, and which have poisonous properties. It is probable that the dried beef purchased in Momence had previously begun to putrefy, and these poisonous substances were formed. The fact that several of those affected noticed a bitter taste to the meat would confirm this opinion. It is a fact which has not received the attention it deserves, that in many of the reputed cases of poisoning from dietary articles, disagreeable, peculiar, or bitter tastes are often noticed by the patients, and that those who are wise enough to take the hint which nature thus gives them, and at once refuse to partake further of the article in question, usually escape; while the others, who neglect this warning, suffer. This has been noticed in poisoning by canned tomatoes and apples, as well as by meat.

The recent studies upon the movements of anadromous fishes in our Atlantic rivers and estuaries, the results of which are in part announced in another column, are of considerable moment from several points of view. Much has already been written in a theoretical way concerning the influence of temperature upon the migrations of fishes, upon their times of spawning, the period of hatching, and their rates of growth. The literature of the subject has not, however, been entirely satisfactory, since a definite correlation of observed fact with explanatory hypothesis has rarely been attempted. The same may be said of the literature of fish-culture, which has been to a considerable extent prophetic in character. One of the most important of recent conclusions is that fishes do not of necessity always return to spawn upon the grounds where they themselves first left the egg, but that slight variations of temperature are sufficient to divert a school of fishes from any river-basin into another. An important practical conclusion is at once suggested; namely, that the success of fish-culture in any hydrographic basin is so dependent upon similar operations in adjoining waters, that co-operative action of the states is absolutely necessary, either through the agency of the general government or by combinations between the state commissions. It is gratifying to know that the mass of water-temperature records which has for fifteen years been accumulating through the labors of the United States fish commission, the signal service, and the light-house board, has at last become sufficiently great to afford data for the comparative study of periodical averages. All students of marine zoölogy will profit by the study of these temperature tables, which, we are informed, are soon to be published. The rapid advances which are now being made toward the elucidation of the life histories of American fishes lead us to hope that the time is not very remote when our knowledge of the phenomena of marine life shall be made more definite in character than at present.

The attempt to establish a zoölogical garden in America after the plan of those already in existence in Europe was a novel and interesting one at the time that the Philadelphia zoölogical society was organized. The garden was opened under the most favorable circumstances. The popular sentiment was successfully appealed to, and during the centennial year the garden received a fair share of the public patronage. But the favor which attended the beginning of the enterprise has not continued. The society has been conducted at a loss for several years. The anticipated deficit for the current year is seven thousand dollars, an amount so large as to induce the directors to invite the citizens of Philadelphia to meet to hear a statement of the society's affairs, and to discuss measures for their relief. At a representative meeting of the citizens, held November 5, it was quickly discerned that the garden of the society had a firm hold on the affections of the people. There appears to be no doubt that a successful effort will be made to meet the year's deficit, and to devise means by which the society can be placed upon a permanent basis. The management of zoölogical gardens in America will be found to be

a different problem from that of their European progenitors. An interest in zoölogy is with us less diffused than is the case abroad, the climate is less favorable for out-of-door recreation, the gardens are at great distances from the centres of population, and the cost of securing many of the larger and more interesting animals is great in proportion as the gardens are removed from the chief places of traffic. The zoölogical garden in this country is not likely ever to be self-supporting. Whether or no the zoölogical garden should have a plan of organization distinct from that of the botanical garden is a mooted point. It would appear that there is nothing inconsistent with the idea that the plan of the learned society or the university might readily embrace that of the management of a collection of living animals. Were such an arrangement practicable, it would enable the garden to be benefited by the use of the general endowment of such bodies, while it would not interfere with the popular uses of the collection.

NOTWITHSTANDING THE FACT that the whole civilized world is interested in the subject of the transfer of ships across the narrow neck of land which separates the Atlantic and Pacific Oceans, by which the long voyage around Cape Horn would be avoided, yet there has been no project proposed or suggested which has met with less favor in the minds of engineers of high standing, at least in this country, than the Panama Canal. The magnitude of the enterprise, the formidable engineering difficulties to be encountered, the unhealthiness of the climate, and the fact that the undertaking is a private one, depending on private subscriptions, constitute obstacles which, when taken together, seem to render success almost hopeless. The recent call for more money to carry on the work, when the most costly and difficult portions have hardly been begun, and after vast sums have already been expended, must awaken grave apprehensions on the part of those who have already invested their money in the enterprise, that the project is beyond the financial abilities of the most powerful syndicates.

AS THE INCOME of the Elizabeth Thompson science fund is already available, the trustees desire to receive applications for appropriations in aid of scientific work. This endowment is not for the benefit of any one department of science, but it is the intention of the trustees to give the preference to those investigations, not already otherwise provided for, which have for their object the advancement of human knowledge, or the benefit of mankind in general, rather than to researches directed to the solution of questions of merely local importance. Applications for assistance from this fund should be forwarded to the secretary of the board of trustees, Dr. C. S. Minot, 25 Mount Vernon Street, Boston, Mass., and should be accompanied by a full statement of the nature of the investigation, of the conditions under which it is to be prosecuted, and of the manner in which the appropriation asked for is to be expended. The first grant will probably be made early in January, 1886. The fund was originally given by Mrs. Thompson, as will be remembered, with the expectation that it would be administered by the officers of the International scientific association proposed at the Philadelphia meeting of the American association. This proposition was to have been brought up at the Aberdeen meeting of the British association; but, so far as known, no action was taken. The fund is now in the charge of the able body of trustees already named, (*Science*, vi. 144), and will doubtless prove a great aid to American science if the best investigators will ask for appropriations from the income. It is a severe comment upon the physicists of the United States that the income of the similar fund established by Rumford for investigations in light and heat should go begging as it does.

THE AGASSIZ MUSEUM AT CAMBRIDGE.

THE day after his twenty-third birthday, Agassiz wrote from Munich to his brother, "The thing I most desire seems to me, at least for the present, farthest from my reach; namely, the direction of a great museum." He lived to see the Museum of comparative zoölogy, which he founded on another continent, the largest collection, covering the whole field of natural history, ever brought together by the endeavors of a single individual. Reckoning from the inauguration of the first section of the building, to-day completes its quarter centennial, and renders appropriate a succinct account of its inception and growth, largely in the words of his son, Dr. Alexander Agassiz, when addressing, last spring, the friends of the institution at the opening of the latest extension of the building.

The recently published 'Life of Agassiz' shows us that his passion for acquisition was enormous from his youth. Wherever he went, his collections in natural history accumulated to a burdensome degree; and, although he left every thing behind him

when he came to this country, ten years had not passed before he had here amassed collections not only from America, but from all parts of the world, which it would stagger many a university to support. Yet his aim was, not to found a museum which should be a mere accumulation, but one that "should have a well-combined and clearly expressed educational value." The bequest of his friend, Mr. Francis C. Gray, in 1858, of fifty thousand dollars, was the initiation of the final enterprise; and when the new institution was inaugurated, two years later, it possessed, besides the Gray fund, a building erected by private subscription to the amount of over $71,000, a fund of $100,000 granted by the state through the personal exertions of Agassiz, and the collections obtained by his indomitable zeal.

The bequest of Mr. Gray, quadrupling itself in two years, did not find Agassiz unprepared. Indeed, it was the knowledge of plans, to the utmost details of which he had devoted years of thought, that had moved the gift of his friend. He would have the museum represent in each department the sum of our information in special zoölogy, comparative anatomy, embryology, paleontology, and zoölogical geography. He would have it illustrate at once the structure and mode of growth of animals, their order of succession in geological times, and their geographical distribution upon the surface of our globe; the relations between the animals of past time and those now living, and between the law of succession in the former, and the laws of growth and distribution in the latter.

"A museum founded upon a comparative study of living and fossil animals in connection with their embryonic changes and their geographical distribution could no longer be called simply a zoölogical museum," said Agassiz in his inaugural address: "ours is a museum of comparative zoölogy."

How large his expectation was may be seen by what he wrote as early as 1858:—

"My hope is that there shall arise upon the grounds of Harvard a museum of natural history which shall compete with the British museum and with the Jardin des plantes. Do not say that it cannot be done, for you cannot suppose that what exists in England and France cannot be reached in America. I hope, even, that we shall found a museum which will be based upon a more suitable foundation, and better qualified to advance the highest interests of science, than these institutions of the old world."

By a strange coincidence, the foundation of the museum dates from the publication of Darwin's 'Origin of species.' Of course, so powerful a movement in the scientific thought of the time could not fail to modify the problems which the institution was intended to illustrate and to solve. Yet the usefulness of the plans laid down for the museum remains unimpaired by the new methods of treating questions of affinity, of origin, of geographical and geological distribution. Should the synoptic, the systematic, the faunal, and the paleontological collections cease to bear the interpretation given to them by the founder, their interest and importance, even for the advocates of the new biology, would not be one whit lessened. If the anatomical, embryological, synthetic, and other series presented by the pupil of Cuvier from his point of view, are differently considered to-day by the followers of Darwin, they may, for this very reason, have gained a general interest they did not formerly possess.

The plans of the founder have been realized, perhaps, far beyond his most sanguine expectations; and it has been reserved for his immediate successor to see the establishment of a prosperous school of natural history, amply provided with laboratories, connected with a university, and recognizing in the administration of its trusts the claims of the college and of the advanced students, as well as those of the original investigator. Nor has it neglected the interests of specialists, but has accumulated extensive collections, conveniently stored, and easily accessible to all who are able to make a proper use of this material.

The publications of the museum (eleven volumes of bulletins, and thirteen of memoirs) give, with the addition of the monographs thus far issued by workers at the museum, a fair idea of the field covered by its various departments, though they do not sufficiently represent the original work done by the teaching staff of the university and its students.

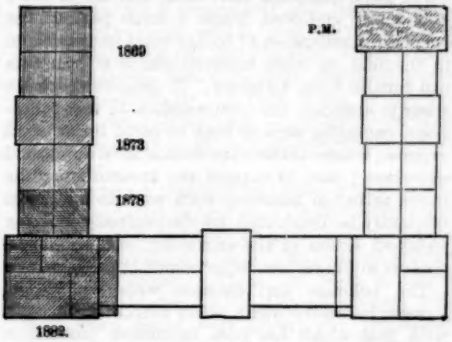
The library has grown from a few hundred volumes to an important collection of biological works, numbering over 17,000 volumes, exclusive of pamphlets and of the Whitney library.

In 1860 the building covered a space eighty by sixty feet, and it contained, in all, sixteen rooms, used as lecture-room, laboratories, store-rooms, and exhibition-rooms. A visitor to the museum in those early days would now find it difficult to recognize the rooms or their contents in the present arrangement. During the early years of the institution, every thing had to be sacrificed to the exigencies of the rapidly accumulating collections. But the difficulties involved in so large an undertaking prevented Professor Agassiz from fairly developing his schemes; and it became evident at the time of his death that only a radical rearrangement of the collections could give distinct expression to his plans.

The ground covered by the building as it stands to-day is five times as great as in 1860. There are no less than eighteen exhibition-rooms, with their corresponding galleries, of which eleven are open to the public. Thirty-two rooms are used for storage and quarters for special students and assistants. There are also a lecture-room twice the size of the former, a curator's room and office, eleven laboratories of biology and geology for college and advanced students, four rooms devoted to the library, and in the basement, in addition to boiler space, rooms intended as an aquarium and vivarium and for receiving freight; making, in all, seventy-one rooms and twelve galleries. These rooms are all comparatively small, mostly 30 by 40 feet, no attempt being made at exhibition-rooms imposing from their size. All are not yet complete, but the space now devoted to the different classes of the animal kingdom, zoölogically arranged, contains all that will be given for public exhibition, no matter how extensive the collections may become; for limited collections carefully assorted are far more intelligible to the general visitor than larger and more indiscriminate ones; the visitor sees only one thing at a time, and is not bewildered by room after room or case after case of specimens which seem to him to have no meaning.

In the 'synoptic' room, centrally placed, a favorite scheme of Professor Agassiz, the visitor will get an excellent idea of the great types of the animal kingdom, unencumbered by a mass of detail. He may pass thence to one of the 'systematic' rooms, of which there are five, devoted one each to mammals, birds, fishes, mollusks, and to radiates and protozoa, with their galleries devoted to reptiles, insects, and crustacea. Following these, he will turn to the 'faunal' rooms, — one each for North America, South America, Africa, India, Australia, and Europe-Siberia. To study the birds, for instance, he will visit not only the room devoted to the illustration of their zoölogical affinities, but the several faunal rooms, where he will find the birds characteristic of each province, repetitions being as far as possible avoided. This plan obviates the crowding together into one space of the whole collection of birds, which merely satiates the visitor, and teaches him little. Two other rooms, not yet opened, will be devoted to the marine faunas, where the geographical and bathymetric distribution of the animals of the Atlantic and Pacific will be shown. A similar double plan is contemplated for the fossils, to which four exhibition-rooms will be devoted.

The original plan of the museum contemplated a main building 364 feet long by 64 feet wide, with wings 205 feet long and of the same width, built as in the accompanying plan, in which the section in vertical lines represents that first constructed; that in oblique lines, the portion added before the death of Agassiz; and that in crossed lines, the



additions at two successive periods since. The portion on the right, in broken lines, was given over to the Peabody museum of archeology. At the time of the death of Professor Agassiz, the buildings and collections represented an expenditure of about $200,000, and the invested funds amounted to about $185,000. The invested funds now amount to more than $580,000, while the additions to the building and collections since that time represent an additional expenditure, besides the running expenses of the museum, of more than $500,000, — an amount very largely due to the unstinted generosity and filial devotion of the present director.

Witnessing this enormous growth, Mr. Agassiz looks at the future with no small concern. He would hold fast to what has been gained, but hesitates to commit himself to any further rapid advance in the same direction, believing that the limits of a university organization for such an institution have already been reached. While it is undoubtedly capable of indefinite expansion in the way of endowments for special professorships and assistants, it is doubtful if it be wise to expect or aim at any expansion beyond that which naturally comes from the demands of endowed chairs in a university. Original investigation has always been best promoted in connection with educational institutions; and museums should grow in conformity with their demands, and no faster, unless they are to become mere unwieldy and meaningless accumulations.

If the material growth of the past is to continue, the resources of the institution, large as they are, will soon be entirely inadequate. An attempt has therefore been made to combine the work of assistants and that of investigation, in order that the resources of the museum may keep pace with

the ever-increasing specialization in the different branches of natural history. More than that, the conditions and opportunities for special work have greatly altered in this country within recent years. Other large museums have been founded or more abundantly endowed, while a large part of the original investigation of to-day must be carried on in the field on fresh material which no museum can furnish from its stores. It therefore becomes wiser to abandon the accumulation of vast collections, excepting such as may be cared for at small expense, wherever these are certain to be duplicated elsewhere; and to expend the income from the funds rather in fostering such work as may most efficiently be conducted by the professors holding endowed chairs in the university, and by the assistants in the various departments of the museum.

The boldness and decision with which Mr. Agassiz here advocates a policy utterly at variance with that which has been heretofore pursued, is worthy of the most careful attention of all who have to deal with museums. From his position at the head of an extensive establishment, in which he has complete control, and which he has himself largely endowed, he occupies an unequalled vantage ground. He has cut completely adrift from the traditional notions of what a great museum should be, while adhering rigorously to the exhibitional features impressed upon the museum by his father. In this we believe he has struck the keynote of what is needed for a university museum in this country, and what the requirements of modern science demand. We commend his views to all who have to deal with the expensive problem which natural history museums force upon the attention.

ANSWERS TO CHARGES AFFECTING THE GEOLOGICAL SURVEY.

Secretary Lamar has received from Major J. W. Powell, director of the geological survey, a letter, of which the following are the most important portions:—

Various charges affecting discreditably the administration of the geological survey have been current in the newspapers of the country for the past four months, and I deem it my duty to call your attention to the same, and to append brief statements to them severally, that you may see how baseless and absurd they appear in the presence of the truth.

It is charged that the survey has been extended into the eastern portion of the United States in violation of law. The law specifically provides that the survey shall extend over the entire United States, and the law was passed after repeated and lengthy debate in congress by an overwhelming majority.

It is charged that the geological survey is duplicating the work of the coast survey and of state geological surveys. There is no truth or color of truth in the statement.

It is charged that a corrupt conspiracy existed in the National academy of sciences to break down the old organization for geographical and geological surveys in order to create the new; that the National academy itself had little to do with this, but that the conspiracy was the work of a corrupt committee. In an act of congress approved June 20, 1878, the academy was required to report to congress a plan for making a topographic and geologic survey. Such plan was reported, and the present geological survey exists in pursuance of that plan, under specific statutes passed by congress. The committee of the academy that considered the subject was composed of Profs. O. C. Marsh, James D. Dana, William B. Rogers, J. S. Newberry, W. P. Trowbridge, Simon Newcomb, and Alexander Agassiz. The plan was reported by the committee at a meeting of the academy called for the purpose of hearing the report, and was discussed at length in the academy, and adopted unanimously.

It is charged that the scientific men of the National academy of sciences, in wicked collusion with Major Powell, "proposed to wipe out the lines which now fix the limits of all lands sold from the public domain of the entire country, and introduce a new system." There is no truth and no color of truth in the statements; its falsity is equalled only by its absurdity.

It is charged that Major Powell was elected a member of the National academy of sciences by corruptly distributing patronage to its members. Major Powell was elected to membership in the academy prior to his appointment as director of the U. S. geological survey, and at a time when he had no patronage under his control to be used with the members of the National academy.

It is charged that the publication of the geological survey is not germane to its work, and Packard's 'Report on geometrid moths' is given as an illustration; and it is stated that nearly all the publications of the survey are of the same class. This work of Dr. Packard's was not published by the U. S. geological survey, but by what was known as the Hayden survey years ago. The law now prohibits the publication of general works on natural history by the survey, and confines the publication to works germane to geology and geography.

It is charged that "Major Powell has a fondness for state geologists. Now, if Powell can give a

state geologist $4,000 a year, as he does in several cases, the geologist is so much better off." No state geologist has ever received a cent of salary from the U. S. geological survey. In connection with the above charge, the names of all the geologists and assistant geologists in the geological survey are given, together with their salaries: and the statement is made in such a manner as to make it appear that they are all state geologists, when, in fact, not one of them is employed by a state.

It is charged that Captain Clarence E. Dutton, of the ordnance corps, receives his salary as captain in the army, and also a salary as geologist in the geological survey. Captain Dutton receives his salary as captain in the army, but does not receive a salary as geologist; and his detail as an officer in the geological survey is made under authority of a specified act of congress, and his detail has been extended by the present secretary of war.

It is charged that collections of fossils which cost in one instance $50,000, and in another $100,000, instead of being deposited in the national museum, have been diverted to the private museums of Professor Marsh of Yale college, and Professor Cope of Philadelphia. The geological survey has fossils in the hands of Professor Marsh of Yale college. It also has fossils in the hands of Professor Newberry of New York, Professor Fontaine of the University of Virginia, Professor Leidy of Philadelphia, and various other persons throughout the United States. The collections of the geological survey are sent to specialists for their examination, and the statute organizing the geological survey contemplates this by providing that when the specialists have finished their work on the collections, they shall then be deposited in the national museum.

It is charged that $112,000 was paid out for salaries in excess of the amount appropriated for that purpose last year. There is no truth, or color of truth, in the statement.

CRUISE OF THE CORWIN.

THOSE interested in arctic matters will recall the pleasure afforded by a modest octavo report, issued by the Revenue marine bureau in 1881, on the explorations of the Corwin during the season of 1880. The following year the officers of this gallant little cutter seem to have outdone themselves, and, among a variety of creditable explorations, had the honor of being the first civilized men to set foot on Wrangell Island, afterwards more completely surveyed by the officers of the U.S.S. Rodgers. This land, first reported by the Chukchi to Russian traders, was first seen by Kellett, who saw the tops of the highest land, and called it Plover Island, located it erroneously, and, having reported much more land which was only mirage, his whole discovery fell into discredit, if not oblivion. The land was first accurately described, named, and located clearly, by Capt. Long, of the whaling fleet, who did not land, — an honor reserved for Hooper and his party, and afterward for the Rodgers party.

Report of the cruise of the U.S. revenue steamer Thomas Corwin, in the Arctic Ocean, 1881. By Capt. C. L. HOOPER, U. S. R. M., commanding. Washington, *Government*, 1884 [1885]. 147 p., illustr., 16 pl. 4°.

The present report gives in detail an account of the voyage, and is profusely illustrated by cuts in the text, of a not very accurate or always useful kind, and a number of heliotypes from photographs made by Nelson. These are poor, considered merely as pictures, for the difficulties under which they were taken were great; but intrinsically they are extremely valuable. They contain portraits of numerous Innuit, Tsau-chu (or Chukchi), and ethnological objects of special interest. The text contains much that is of interest to the general reader, but is less useful to the student than the small report of the previous voyage. Probably nothing was farther from Capt. Hooper's mind than the idea, that, by incorporating material from other sources, he was doing an injury to his report. It is quite true, however, that in many cases it is impossible to determine whether a given statement is the result of personal observation by himself, or an inference from the observations of others; and the value of the work as a contribution to knowledge is seriously impaired by this state of things. There is some hasty generalization, and rarely a distinct error, as in the statement that the Asiatic Innuit have entirely disappeared except at East Cape (p. 100). It is well known that they have not disappeared, and are not likely to, and that the short stay of the Corwin party at any one point often did not enable them to learn to which of the two races their casual visitors belonged. The long delay of publication, also, has made some of the statements obsolete, especially in regard to currents, which Capt. Hooper discusses at some length, and comes to conclusions which would be to some extent modified, if reviewed to-day.

The birds, fishes, etc., were treated by Nelson, Bean, Rosse, and others, in a publication which appeared some time since. In the present volume are some useful meteorological summaries from Nelson's note-books, and a characteristic effusion on glaciers, by John Muir. This gentleman's devotion to glaciers and their work is sufficiently well known to American geologists to need no serious attention here. Foreign readers, however,

may be benefited by the reminder that other observers, including some of Mr. Muir's companions on the trip in question, have been unaccountably blind to the remarkable phenomena upon which some of his far-reaching conclusions seem to rest.

Such records as this volume affords, in spite of minor defects, are most creditable to the bureau and its officers; and it is to be hoped that the series may be indefinitely continued.

NEW BOOKS.

**** For full titles see 'Publications received at editor's office.'*

'THE perfect way in diet' (Kingsford) is a translation of a thesis presented, in 1880, by the author, for her degree of doctor of medicine, and is a plea for a return to the natural and ancient food of our race, which is better understood when one knows that Miss Kingsford is a vegetarian. —— 'The Russian revolt' (Noble) gives a history of the development of the country, showing the effects of contact with western civilization, and closes with an appeal for a constitutional government for Russia. —— 'Wanderings of plants and animals' (Hehn and Stallybrass) is an attempt to trace the origin of well-known plants and animals by historic and philologic methods. The author holds that Europe owes much more to Asia than the mere botanist and mere zoölogist are willing to admit; that the flora of southern Europe has been revolutionized under the hand of man; and that the evergreen vegetation of Italy and Greece is not indigenous, but is mainly due to the sacred groves planted around the temples of oriental gods and goddesses. He has much to say of Indo-Europeans, or Aryans, at the time of their settling Europe, and holds that the builders of the lake villages in Switzerland were Aryans at a comparatively advanced period. In fact, the low condition of the Aryans on entering Europe, and their subsequent obligations to other Aryans in Asia, and, above all, to the Semitic races in Palestine, form, perhaps, the central idea of the book. —— 'Chemical conversion tables' (Battle and Dancey) are intended to meet a long-felt want on the part of agricultural analytical chemists for some relief from the time-consuming calculations necessary to convert the result of each separate determination into the customary per cent. They embrace only what is required in the analysis of commercial fertilizers and their derivative constituents. —— 'Notes on the chemistry of iron' (Troilius) gives a description of such chemical methods of analysis in iron and steel manufacture as have come under the author's personal observation. —— 'History of Japan' (Thorpe) is a history of the country from the earliest times, giving an account of the primitive religion, and of the different dynasties, and ends with an account of the recent progress of the country. —— 'The principles of house-drainage' (Putnam) contains lectures delivered before the Suffolk district medical society, the Boston society of architects, and the Massachusetts institute of technology, on house-drainage, and the proper construction of wash-basins, closets, soil and drain pipes, with hints as to the size and general arrangements of piping. —— 'First lessons in amateur photography' (Spaulding) gives the beginner, in a few pages, an account of the general method of taking a negative, and obtaining from it a silver print. The subject-matter is arranged in the form of seven short lectures, which were originally delivered before the senior class of a high school. That portion of the book relating to the camera and lens is treated very briefly, and the description of the process of development of the negative is not stated as fully as might be desired. The general criticism on the book is that there is not quite enough of it. —— 'De l'effet artistique en photographie' (Robinson et H. Colard) begins where most books on photography leave off, treating photography wholly from the artistic side, and doing so in a very thorough and satisfactory manner. We can commend the book to all who wish to study the principles of art in photography, and to those who wish to obtain really artistic pictures, whether of landscapes, groups, or portraits.

GEOGRAPHICAL NOTES.

APROPOS of our comments on the facilities for navigation in Hudson Bay (*Science*, No. 142, p. 350), we learn that the company's annual vessel, with a cargo valued at over a million, was recently driven on the bar at the anchorage near Moose Factory, the port of the region, and became a total wreck.

The whaling fleet in Alaskan waters this summer numbered forty sailing-vessels and eight steamers, with a total tonnage of 14,262 tons. No further disasters had occurred up to the latest advices, and the vessels embayed by ice near Point Barrow had been safely extricated. One hundred and twenty-six whales had been taken.

The fishing fleet of the North Pacific has returned to San Francisco. Fourteen trips were made by twelve vessels, aggregating 2,550 tons. The fish taken in Alaskan waters numbered 922,000, and from the Okhotsk Sea 452,000. The value of the catch is about $150,000. This industry has been successfully prosecuted since 1864.

The boundary between the territory of the Argentine Confederation and Brazil, forming the

western limit of the province of Santa Catherina, has been for some time in doubt. Efforts hitherto made to settle it have been fruitless; and the disputed area between the Uruguay and Iguassu Rivers, a strip some seventy-five miles wide, has been regarded as neutral ground. In the little-known region known as the Missiones, formerly governed by the Jesuit missionaries, an old treaty between Spain and Portugal fixed upon two rivers, the Peperi and San Antonio, flowing respectively north to the Iguassu, and south into the Uruguay, as the boundary in question. The determination in modern times of the particular rivers, out of many existing, which were entitled to bear the above names, has been fraught with difficulty. The two governments have now agreed to a joint exploration of the neutral ground, in order that the matter may be permanently settled.

In the report of Governor Swineford of Alaska, recently made public, an interesting *résumé* of affairs in the territory is presented. Educational matters have made some progress, though a want of tact on the part of the agent of the bureau of education, notwithstanding his energy and ability, has aggravated difficulties which, in the nature of things, were serious enough already. The value of the south-eastern part of the territory is warmly maintained by the governor, who upholds essentially views expressed by many travellers, which it has been the fashion, on the part of ignorant or interested persons, to deride as 'rose-colored.' The success of mining and fishing enterprises, and the practicability of auxiliary agriculture, are insisted upon. Hardy vegetables do well, and cattle are sleek and in the best condition. The white population of this part of the territory amounts to 1,900, and that of the partly civilized natives to 7,000 more.

In this connection the New York *Times* very reasonably points out the usefulness of exploration in Alaska, as compared with arctic expeditions. The prospect of a survey of the very dubiously defined boundary will probably before long require systematic and extensive work in this direction. The indirect results of such investigation can hardly fail to be important.

ASTRONOMICAL NOTES.

Standards of stellar magnitudes. — The third report of the American committee on standards of stellar magnitudes states that the zones following the twenty-four selected equatorial stars have received a second careful revision with the Princeton 23-inch, which should make them include all stars down to about 16.0 mag., and that a revision will probably be made with the Washington 26-inch. Four of the charts have been distributed to all observatories having large telescopes, with requests for all visible additions which will furnish comparisons of the penetrating power of different kinds of telescopes. Certain selected standards in each zone, about 0.5 mag. apart, have been measured at the Harvard college observatory with photometer I, and the two brightest, if not too faint, with the meridian-photometer. A catalogue of these selected standards in the twenty-four zones, giving the positions and provisional magnitudes, is published, and also a table of twenty-one close circumpolars ranging in magnitude from 2.2 to 15.7.

Observing comparison stars. — Dr. Gill expresses the hope (*Astr. nachr.*, 2,688) that some of the numerous well-equipped European or American observatories will take up the systematic observation of stars that have been used in comet comparisons, faint stars whose occulations have been observed, zones of stars employed for scale or screw values, or stars that have been used for geodetic purposes. The editor, Dr. Krueger, heartily seconds the proposal, and announces that Dr. Hirsch, director of the Neuchâtel observatory, stands ready to determine the places of such stars at the request of computers of orbits. He hopes to announce later that other observatories have promised co-operation.

The new observatory of Bordeaux. — This observatory, founded in 1871, has just now (*Comptes rendus*, ci. 690) published its first volume of *Annales*, containing a minute description of the instruments (a meridian-circle of 0.19 m. aperture, two equatorials of 0.22 and 0.39 m., and three clocks), and also a determination of the longitude of the observatory. An important piece of work has been undertaken by the director, M. Rayet, in the re-observation of the 23,000 stars in Argelander's southern zones between — 15° and — 31° of declination.

Longitude of the Cordoba observatory. — In the *Astronomische nachrichten*, 2,683, Dr. Gould publishes the finally adopted value of the longitude of the Cordoba meridian-circle, depending upon exchanges of longitude signals with Buenos Aires on the east, and Valparaiso on the west. Buenos Aires was determined by Capt. Green, U.S.N., via Lisbon and Rio de Janeiro, and Valparaiso by Commander Davis, U.S.N., via Washington and Panama, and the two results agree within 0ˢ.05, a very satisfactory accordance. Dr. Gould adopts as the final definitive position of the Cordoba meridian-circle: —

$$\phi = -31^\circ\ 25'\ 15''.46$$
$$\lambda = 4^h\ 16^m\ 48^s.2,\ \text{W.}$$

The November meteors. — The regular November meteors or Leonids, moving in the orbit of Temple's comet (1866 I), are due between the 12th and 15th of the month, probably reaching a maximum display on the night of the 13th. The investigations of Prof. Kirkwood seem to indicate the existence of three separate clusters moving in this orbit, and there is a possibility of the earth intersecting a portion of one of the clusters the present year. Mr. Denning has pointed out that toward the end of the month circumstances appear to be extremely favorable for a recurrence of the Andromeda meteors (see *Science*, vi. 279).

Lick observatory. — In a letter to the *Sidereal messenger*, dated Oct. 20, Professor Holden expresses his thanks to the many astronomers and societies that have generously contributed to the library of the Washburn observatory, and he bespeaks a similar generosity for the Lick observatory, of which he is about to take charge. He requests that parcels intended for the observatory be addressed to the Library of the Lick observatory, San José, Santa Clara county, California, while such as are intended for himself personally be directed to Berkeley, California. Professor Holden says, "Real astronomical work at the Lick observatory will begin as soon as possible. Under the provisions of the trust, no salaries can be paid to observers until after the completion of the observatory; and this date depends upon the time at which the large telescope is finished by the firm of A. Clark & Sons. Every thing else is practically complete. I have hopes that some arrangement may be made by which the meridian circle and the 12-inch Clark refractor may soon be put to use." If the immediate inauguration of systematic observations at this observatory is contingent merely upon obtaining a fund sufficient to employ assistants during the two years, more or less, which must elapse before the permanent funds are available, we sincerely hope that the well-known liberality of California will come to Professor Holden's aid in advancing the interests of her magnificent gift to science.

NOTES AND NEWS.

The *Scientific American* of October 31 contains an article by John C. Goodridge, jun., entitled 'Can the temperature of the Atlantic states be changed?' It is neatly illustrated by two charts, and presents a dangerously entertaining, one-sided statement that will doubtless be pleasant reading to the uninformed. The error that vitiates the whole argument is the implication that the low mean temperature of our Atlantic states depends on their being next to the Labrador current that brings cold water down the coast, and shoves the Gulf stream out to sea. To remedy this defect, it is proposed to dam up the Straits of Belle Isle, as if all the cold water came through that narrow passage, and none reached us from the east coast of Newfoundland! But even if we grant this, and build the dam, our winters would still be cold, for their low temperature depends on the winds from the great north-western interior, and not on the chill of the Atlantic waters.

— A circular has lately been issued by the University of Michigan, descriptive of a scheme of undergraduate geological study, leading to the degree of bachelor of science after four years' work. The subjects belonging strictly to geology are taught by Professors Winchell, Pettee, and Cheever, and embrace general geology and paleontology, mineralogy and lithology, economic geology and metallurgy. Besides these, the curriculum includes a certain amount of mathematics, chemistry, physics, French, German, and drawing, and allows moderate excursions among elective studies. Field-work has no special time allotted in the course, although it is noted that students 'will incidentally acquire skill' in it. This, and the omission of surveying as a required study, seem to us as defects in the plan; the amount of French and German also seems to fall short of that needed to give an effective use of these essential languages; but, as a whole, the course must give a good knowledge of theoretical and practical geology to the inquiring student.

— The Appalachian mountain club announces that a room of moderate size, suitable to the purposes of the club, has been rented in the Ticknor mansion, on Park Street, Boston, possession to be given about November 15. The club is not yet in condition to employ a paid librarian or attendant, but it is expected that by unpaid attendance the room can be open to all club members, without charge, during the afternoon hours of several days in the week, and perhaps, if a sufficient volunteer force can be organized, every afternoon. It is confidently believed that when the books, maps, and photographs of the club are brought together, and made for the first time accessible, the room will prove a very attractive resort to members, and that the plan may be even so successful as to warrant, within a few years, a removal to larger quarters in the same attractive building.

— A meeting of the local committee to arrange for the coming session in Washington, of the American public health association, was held Nov. 3. The committee on transportation reported that a uniform reduction of rates had been secured for members on the railroads all over the country.

At the meeting of the association the prizes offered by Mr. Henry Lomb of Rochester, for the best essays on subjects of sanitary importance (*Science*, v. 80), will be awarded.

— William Benjamin Carpenter, the eminent English physiologist, died in London, November 10, from the effects of terrible burns caused by the upsetting of a lamp while he was taking a vapor bath for rheumatism. Dr. Carpenter was born at Bristol in 1813.

— Among recent deaths we note the following: Dr. Wm. A. Guy, at London, in his seventy-sixth year; Jean Claude Bouquet, mathematician, at Paris, in his sixty-seventh year; Dr. Max Sagemehl, in Amsterdam, August 2; Professor Hjalmar Holmgren, mathematician, Stockholm; Ernest Dubrueil, founder and publisher of the *Revue des sciences naturelles*, at Montpellier, May 14, in his fifty-sixth year; Dr. J. Baeyer, president of the Royal Prussian geodetic institute, at Berlin, September 11, in his ninety-first year.

LONDON LETTER.

THE inauguration of the first practical 'telpher line' seems to have passed into history without adequate notice, though it is, in fact, the commencement of a new means of transportation which wil lprobably develop into an important feature of industrial, if not of social, life. It is not intended to compete with railways, but to do cheaply the work of horses and carts, since by its means mineral or agricultural produce of any kind may be conveyed over considerable distances in large quantities at a comparatively small cost, and up and down steep inclines, without the need of constructing a road. The term 'telpher' is a legitimate, or at least convenient, abbreviation of a Greek compound word signifying 'carrying afar,' and a telpher line may be briefly described as an aerial light railway, driven electrically. The system is the invention of the late Prof. Fleeming Jenkin, F. R. S., and it has been severely tested for some months on a large experimental scale. Prof. Jenkin did not live to see the first practical line completed, and the final arrangements were worked out by Prof. Perry, the engineer to the Telpherage company. The line now under consideration is constructed at Glynde, on the Sussex estate of Lord Hampden, late speaker of the house of commons, and conveys clay from a clay-pit to a railway siding. It was opened on October 19. It consists of steel bars, ¾ of an inch in diameter and 66 feet long, supported 18 feet above ground on T-shaped posts about one chain apart. Two lines of way, an up and a down line (one bar sufficing for each), are supported 8 feet apart on the cross-head of the T, the general appearance of the whole being not unlike gigantic telegraph posts and wires. The carriers, or 'skips' as they are technically termed, are iron trough-shaped buckets, each holding about 2 cwt., and suspended from the line by a light iron frame, at the upper end of which is a pair of grooved wheels, running along the line of rods. A train is made up of ten of these, the electric motor being in the centre. An automatic block system is provided, so that as many as twenty trains can be run on the line at once without possibility of collision. Moreover, an electric governor has been devised, so that the trains run at the same speed both on rising and falling gradients, even when the incline is 1 in 8. The initial source of power is a Ruston & Proctor engine, controlled by a Williams electric governor; this drives a Crompton 6 'unit' shunt-wound dynamo. The maximum difference of potential is 190 volts, and the current for one train is 8 ampères. The Reckenzann motors run in parallel arc, and the resistance of each is large compared with that of the rods used to support the train and convey the current. The uniform speed is about four miles per hour, and it is claimed that material can be conveyed at a cost varying from 4 to 15 cents per ton per mile. A friend of the present writer has proposed to the Telpherage company to lay down a line in Trinidad, to bring material to the coast, the conveyance of which on muleback at present costs nearly $2 per ton.

The death of Dr. Thomas Davidson will be severely felt at Brighton, where he had resided for some years past, as he was accustomed to devote a considerable amount of time and trouble to the arrangement of the geological and zoölogical collections in the town museum.

The beginning of the academical year at Oxford has been signalized by the opening of the new physiological laboratories, at the back of the university museum. The anti-vivisectionist party, in convocation, headed by some prominent resident members of the university, have made two determined attempts to prevent Professor Burdon Sanderson from teaching physiology as it should be taught; but, fortunately for science, their efforts have been unsuccessful, and another great step has been made towards improving the medical school of the university.

On Nov. 9 the International inventions exhibition will be closed. The attendance up to the present time has been nearly 3,750,000 persons, and at present cheap excursion trains are being run from all parts of the British islands. The nightly simultaneous illumination of 10,000 glow electric lamps, and the marvellous chromatic dis-

plays with the electric light and the fountains, under Col. Sir Francis Bolton, still attract large crowds.

At a recent 'Gilchrist trust' lecture in Greenock, by Mr. William Lant Carpenter on the telephone, transmitters were placed on the lecture-table, and a party of ladies in the office of the *Glasgow herald*, twenty-five miles away, heard nearly the whole of the lecture.

In a district of London known as the Borough, and inhabited by a similar population to that in the Bowery, New York, a large theatre has recently been taken, mainly at the cost of the Duke of Westminster and Mr. Samuel Morley, and has been converted into a temperance music hall. For three or four years, on one night a week, for seven or eight months in the year, popular lectures on science are delivered, in which many very eminent men take an interest. Sir John Lubbock will lecture there on Nov. 8, upon ants. Temperance meetings, ballad concerts, and 'variety entertainments' occupy other nights in the week, and the managers are constantly receiving remarkable testimony to the good done by 'the Vic,' or Royal Victoria coffee-hall. W.

London, Oct. 31.

ST. PETERSBURG LETTER.

The meteorological conditions of the last summer have attracted general attention in Russia. It is but too common to hear of the coldest or hottest season remembered by the oldest inhabitant; but the heat of the end of June, and of the whole of July, in the greater part of European Russia, was truly exceptional. In St. Petersburg the mean temperature of July was 21°.2 C.,—the highest since the observations began (1743), with the exception of July, 1757. In Moscow the mean temperature of July was 22°.5 C. — the highest in the seventy-five years' observations, except July, 1826, when it was 0°.1 higher. But as the mean of the present July is from observations outside the city, while in 1826 the observations were made in the city, it is probable this July was hotter. The heat was especially remarkable for its unabated continuance. It seems that long-continued anticyclones existed in the north and north-east of Russia, and thus warm and dry south and south-east winds were prevailing. A very great scarcity of water followed, especially in the south, where already the spring months had been dry. Lakes, ponds, and wells dried up, and some villages were obliged to sell all their cattle for want of water; and that for drinking purposes had to be brought from many miles away. In the north and centre of Russia many swamps dried up entirely, and, in July and August, forest and peat fires occurred in many parts of the country. The large rivers were exceedingly low, and navigation seriously impeded; so that on the Volga there was low water as far down as Stavropol, below Simbirsk, while formerly it was not observed lower down than the mouth of the Kama.

From the beginning of August in some parts of the south, and later on in other parts of Russia, heavy and protracted rains followed, seriously damaging the harvest, and interrupting the building of the railroad from Ekaterinburg to Tjumen, in Siberia.

The first general meeting of the geographical society this season was held on the 14th of October, and the following news was communicated by the secretary: two additional government grants had been received by the society; five thousand rubles for the classification of the collection and publication of the travels of the deceased zoölogist, Sjevertzof, and two thousand rubles for the collection of the music of the songs of the people. The first expedition, to start in 1886, will consist of the musician, Dutsch, and the secretary of the ethnographical section, and will visit the northern part of Russia, where the old folk-lore has been better preserved, owing to the absence of railroads and great cities. A thousand rubles have been bequeathed by the deceased member, Prince N. M. Galitzin, for geographical exploration. The proposed expedition to the glaciers of the Chang-Tengri, in the Thian-Shan, for which the society had granted an allowance, was postponed till 1886.

Besides the Iswestia (transactions), the following volumes of the memoirs have been issued, or are in preparation: vol. xiv., on general geography, containing Dr. Sperck's 'Russia of the far east.' This is a general description of the Amur country, including topography, climate, fauna, flora, ethnography, etc. The most interesting part is that on the colonization. The author has long resided in the country. Vol. xv., part i., will also soon be issued. It will contain the results of the Siberian levelling. This is certainly the most important levelling yet made, from its extent as well as from the importance of the results arrived at, bearing on the geography of Asia, the climate, etc. Part ii. of the same volume is issued. It contains A. Woeikof's paper, 'On a covering of snow, its influence on climate and weather.' Vol. xvi. is in print, and consists of a description of Lapland by Dr. Buchanow, formerly Russian consul at Hammerfest, the fruit of extensive travels in the country.

The branches of the geographical society are generally late with their reports, so that they have but just sent in those for 1884. From the East

Siberian branch (Irkutsk) it is learned that Sannikow travelled on the upper Man River, following it five hundred versts, to its confluence with the Yenisei. He met with numerous and interesting pictured rocks, all on hard, nearly vertical surfaces. Later he visited the Minussinsk district, and described many tumuli, statues, and peculiarly disposed stones, probably having a signification in the burial ceremonies of the former inhabitants. The Caucasian branch (Tiflis) reports generally on the geographical work in the Caucasus. As before, the Caucasian military topographical section has done good work, especially east of the Caspian. The telegraphic determination of longitude between Batum and Nikolaiew has been made. General Stebnitzky has prepared a large work on the orography of the Caucasus. The hydrographical work on the east coast of the Black Sea, under Admiral Zarudny, continues. Four new meteorological stations have begun work, and it is hoped soon to have two stations on the road across the Caucasian chain, and one at Kars. These reports also contain a large amount of information in regard to the other geological and ethnological explorations going on. O. E.

St. Petersburg, Oct. 15.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

Flood Rock explosion.

THE articles upon the Flood Rock explosion contained in your issue of October 16, to which my attention has just been called, though evidently the utterances of men who are more familiar with the quiet work of the study than with the varied and complicated requirements of engineering practice, demand an answer through your columns, in order that the fair-minded portion of your readers may not be misled into erroneous judgments through the unjust and unfriendly remarks concerning the delay in firing the mine that have been placed before them.

The story of the Flood Rock explosion may be told in a very few words. For ten years a great work of engineering, costing a large amount of money, had been going on, the successful accomplishment of which depended upon the successful explosion, by electrical action, of 290,000 pounds of high explosives. The whole work required the most careful study and forethought, to avoid accident to life or limb, and to eliminate, as far as possible, the chances of damage to any part of the system, upon whose good order, at the critical moment, the success of the undertaking depended.

It was essential that, as soon as the mine should be ready, it should be fired, for at any moment there was a possibility of accident to the apparatus, which would delay, if not ruin, the work of years; but at what time precisely we should be ready for the explosion could not be certainly predicted, though from the way in which the work was progressing, we hoped to be ready to fire at high water, 11 A.M., on Saturday, October 10. Work on the mine had been going on night and day under the personal direction of Lieutenant Derby, who spared himself no inconvenience and avoided no danger connected with it, in order to get the thing through in time; and yet, as it happened, the preparations could not be quite completed until a few minutes after 11 o'clock on the day appointed, when the mine was fired. I hardly need say that this delay was unavoidable.

General Abbot, who had been requested by General Newton to take charge of the photographic and the seismoscopic arrangements for the explosion, had by personal application to the superintendent of the Western union telegraph company, secured the use of a wire for a short time, from the firing point at Astoria to Patchogue in one direction, and to West Point in the other; and when the representative of the geological survey applied to him for information in regard to the explosion he offered to send chronometer ticks to the Western union office in New York, so that they might be transmitted to the observers who were not under his (Gen. Abbot's) orders. No advantage was, however, taken of this offer, though the Western union company would doubtless have been as willing to grant the use of their wires to these gentlemen as to General Abbot.

One of our engineer points of observation, that at Willet's Point on Long Island Sound, was not connected electrically with the firing point; the nearest telegraph station being three miles distant, at Whitestone. Yet the young officers who were detailed to watch the seismoscope there, watched until they got their observations, and would have watched for an hour if necessary, or until notified to stop. Observations, it is stated, were also successfully made at Columbia college, Yonkers, Princeton, and Cambridge, though none of the observers at these places were in electric connection with the firing point.

The same degree of intelligence which secured successful results in these instances would doubtless have prevented Professor Paul from losing his observations at Staten Island, and would have saved him the discredit of having written a very ill-tempered letter; and an intelligent study on his part, of the results of the explosion at Hallet's Point in 1876, would have prevented him from mistaking the slight disturbance which he observed, for that which would necessarily be produced by the explosion of nearly 150 tons of high explosives.

If, then, there was, as has been charged, any blundering or want of intelligent co-operation in this matter, it is evident that it was on the part of those who failed to take the necessary precautions to insure the success of their observations, and not on the part of the corps of engineers of the army, whose long and honorable service has been uniformly marked by an intelligent and faithful performance of its duties, and by freedom from mean and degrading jealousies.

WALTER MCFARLAND,
Lieutenant-Colonel of Engineers.

New York, Oct. 28.

I fully acknowledge that the time observations upon the explosive waves from Flood Rock were a matter of secondary importance, mostly of scientific interest, and, even in the 'quiet of the study,' think I can appreciate, perhaps not fully, but in a high degree, the complicated difficulties in the way of

successfully bringing about the explosion, so graphically described in Colonel McFarland's letter.

From the stand-point of an outside would-be observer, the story of the Flood Rock explosion may be told as follows. The idea of determining the velocity of the vibrations through the ground was suggested at a late date, and the preparations were necessarily hurried and incomplete. No official information could be obtained, fixing even approximately the date of the explosion, and we were obliged to depend upon the newspapers for that information. Near the end of the week preceding its occurrence, the papers announced that the time was set for Wednesday, October 7, at 9 A.M. We hurriedly collected the apparatus prepared to date, boxed it, and shipped it to New York on Monday the 5th, and were to follow it that night, when the evening papers announced a postponement probably till Saturday the 10th. Nearly all the astronomical observatories within 200 miles of New York had been invited to co-operate (see *Science*, vi. 327), and had been asked to watch the New York papers, and been promised a telegram several hours before the event, fixing, if possible, the nearest minute at which it would occur.

The announcement and warning by General Newton on the afternoon of Thursday the 8th, together with a letter at the same time to the representative of the geological survey, were the first information we had of the time set for the explosion.

I would say that General Abbot cordially co-operated with us, and that his offer to send his time-signals to the Western union office (after the explosion) was duly appreciated. We did not take advantage of it, however, as it would have been very troublesome to distribute signals to fourteen observatories or institutions scattered in all directions over an area of 200 miles radius, and it was entirely unnecessary, as every one of them had the means of determining standard time for itself, or was in daily receipt of standard-time signals at noon. With the delay in the time of firing, of which we do complain, we understand that General Abbot had nothing to do.

It should be distinctly noted that the engineer observers within sound of the telegraphic ticks from the chronometer at Astoria, and waiting for the preliminary automatic signal from the firing-key, were in a vastly more favorable position in case of delay; and if this had been anticipated, and there had been time and opportunity to distribute the chronometer ticks and firing-signal to all the outside stations, of course it would have been done.

Regarding the observations cited by Colonel McFarland as having been successfully made at Columbia college, Yonkers, Princeton, and Cambridge, I would say that, at the first two, it was due to their proximity, while, in view of Professor Young's description of the Princeton observations (*Science*, vi. 335), it seems somewhat of a strain upon the meaning of language,— unless used in some approximate, engineering sense,— to call them a success; and at present the writer considers it somewhat doubtful if the Cambridge observations refer to the explosive wave. The statement that the two officers at Willet's Point would have watched an hour, if necessary, only goes to show how much better posted the engineer observers were as to a possible delay in the firing.

As to my own observations at Staten Island, their failure is of itself of little importance, but it is to me a source of wonder and sincere admiration to see how much more an engineer officer can know about them than the observer himself. They will be described in due time with the other reports. At present I can only say that under the same circumstances, if endowed with only the same 'degree of intelligence' I then possessed (even after a study of the Hallet's Point explosion of 1876), I should probably do just the same again; but, with the rapid growth since Oct. 10 of my knowledge of engineering science, I can hardly state now how long I would *not* wait for the occurrence of a definitely predicted engineering phenomenon.

Suffice it now to say that eight out of the seventeen stations were successful in observing either the first arrival or the pretty certain non arrival of the vibrations. The others were all thrown off by the delay, combined, in four cases, with observation of earth-tremors occurring at several places during the first ten minutes after eleven. It would almost seem as if the earth itself were, about that time, growing uneasy at the delay in the oncoming of the dread event.

H. M. Paul.

Washington, Nov. 9.

The arms of the octopus, or devil fish.

Prof. T. Jeffrey Parker (*Nature*, October 15, p. 586) refers to an octopus of the New Zealand fauna, with arms five feet five inches long, as the longest seen by him, and as exceeding what Mr. Henry Lee calls the longest-armed octopus known, namely, that from Vancouver Island, which had arms five feet long.

In 1874 I speared an octopus in the harbor of Iliuliuk, Unalashka, which was afterward hung, by a cord tied around the body immediately behind the arms, to one of the stern davits of the coast survey vessel under my command. As soon as the animal died and the muscles relaxed, I noticed that the tips of the longer tentacles just touched the water. On measuring the distance with a cord, I found it to be sixteen feet, giving the creature a spread from tip to tip of the longest pair of arms, of not less than thirty-two feet. The arms toward the tips were all exceedingly slender, but rather stout toward the body, which was somewhat over a foot long. The largest suckers were two and a half inches in diameter; the whole creature nearly filled a large washtub. Parts of this specimen are now in the U. S. national museum. Having heard octopi were eatable, and the flesh looking white and clean, we boiled some sections of the arms in salt and water, but found them so tough and elastic that our teeth could not make the slightest impression on them.

Wm. H. Dall.

Washington, Nov. 3.

The care of pamphlets.

In printing my letter on p. 408 of your issue of Nov. 6, you printed the Dewey classification numbers with a comma, thus obscuring their character as decimals. According to the custom of Mr. Dewey, you might have placed a comma or period after the third figure, but unless you did that you should have printed them without punctuation marks; 526, for instance, is a primary division, of which 52641 is a subdivision.

P. Pickman Mann.

Recent Proceedings of Societies.

Academy of natural sciences, Philadelphia.

Nov. 3.— Professor Heilprin took occasion to call attention to a series of cuttings along the line of the new Baltimore and Ohio railroad, in the neighborhood of Fifty-eighth Street and Gray's Ferry road. The exposures run through the glacial drift, red gravel overlying the bowlder clay at Fifty-eighth Street to a height of five or seven feet, and resting immediately in a straight line on the top of decomposing gneiss without any interposed yellow clay. He had been informed by Mr. Aubrey H. Smith, that, contrary to the usual disposition, a stiff blue clay underlies the gravel at Gray's Ferry. —— Mr. Thomas Meehan referred to the recent poisoning of children who had eaten roots which were asserted to be those of the wild parsnip. Inquiry into similar cases had frequently determined the noxious roots to belong to Cicuta or Conium maculatum. He had, however, planted a root of the kind eaten by the Danville children, and had found, when it sprouted, that it was, in fact, the ordinary garden parsnip, Pastinaca sativa. He had since been led to believe that when raw and in the spring the common parsnip is very acrid, and in some cases poisonous. Cooking, of course, renders it entirely innocuous. —— Mr. Redfield stated that when a child he had been warned against touching the wild parsnip, which grew in abundance in his neighborhood. He found, however, that he could handle the plant with impunity, although on a relative it had almost the same effect as poison ivy. —— Mr. Wm. V. McKean, referring to a paper on the coloring of autumn leaves, recently published by Mr. Charles Morris, inquired the reason for believing that the change of color indicated approaching decay in the leaf while it was regarded as a sign of perfection in the fruit. For his own part, he regarded the change in the leaf and in the fruit as of essentially the same nature, and as preceding, in each case, decay and death. That the distinction indicated was not a valid one was evident from the fact that highly-colored leaves sometimes remain perfectly healthy long after the ripe fruit has decayed. —— Mr. Morris regarded the coloring of fruit as an indication of the perfection of the seeds, and therefore a corresponding perfection of their envelope. The functional activity of leaves decreases and their protoplasm is withdrawn into the plant as the change of color progresses, while the contrary, he held, was the case in fruit. —— In answer to Mr. McKean, Professor Heilprin stated that he had not observed anywhere in Europe an autumnal change in foliage corresponding at all to the vivid colors of the American forests in October. The vegetation of the Mediterranean area would correspond to some extent with that of our southern states, but the climate of central Germany might be compared with our own. In the region referred to, however, the maples, beeches, and oaks presented no such tints as those with which we are familiar. As an indirect evidence that this was the case in Europe generally, it might be remarked that autumn landscape painting was essentially an American art. It is said that one of Bierstadt's gorgeous views of Rocky Mountain scenery had actually been rejected by the committee of the Paris Salon on the ground that such tints as the artist had put on his canvas were impossible in nature. The American consul afterwards certified to the correctness of the coloring, and the picture was accepted. The speaker held that while the coloring in both leaf and fruit precedes a loss of vitality, in the case of the former the change occurs somewhat nearer the close of its career as an organ. He referred to Mr. Wharton's investigation on the cause of the change of color in leaves. —— Mr. Meehan regarded the change of color in leaves and fruit to be much more of a vital than a chemical process. Trees which abroad remain dark green until the end of the season, if transplanted to America, will retain this peculiarity for several years, until the check on high vitality produced by change of surroundings will eventually produce a tendency to change of color in the autumn. Branches of maple which have been injured will sometimes become scarlet in midsummer. An apple, if taken from the stem while green, will never become red, although it might have done so if left on the tree, indicating the necessity for continued vital activity, although chemical changes may, of course, have something to do with the effect produced.

Cincinnati society of natural history.

Nov. 3.—Dr. W. A. Dun gave an account of the exploration of a mound in Greene county, Ohio, in which an unfinished slate ornament and a perfect arrow-point were found. He also referred to the examination of a number of graves in Ross county, Ohio. There were fifteen or twenty of them in a ten-acre field. They were circular, and each one was from twenty to twenty-five feet in diameter, and about fifteen inches high. Copper beads, pieces of mica, and stone ornaments were found, besides great quantities of bones. The writer regarded these graves as those of modern Indians, and thought also that the small mounds spoken of by Squier and Davis as found at Mound City, only a few miles away, as probably having the same origin. —— Dr. Dun also read a paper on the cicada in Ohio. About two miles from Cincinnati the cicada first made its appearance on May 28. By June 21 they had entirely disappeared. To Dr. Riley's list of counties where the locusts were found, Dr. Dun could add Hamilton, Butler, Montgomery, Clark, Madison, Champaign, and Ross. —— Prof. Jos. F. James presented a paper on the Cephalopoda of the Cincinnati group. In this were given descriptions of all the genera and species of the class found in the rocks in the vicinity. The original authorities had been consulted whenever possible. Keys to the genera and species were added for the use of students, and a bibliography appended. Forty-one new members were elected.

Calendar of Societies.

American academy of arts and sciences, Boston.

Nov. 11.— Allan Marquand, A new logic machine.

Society of arts, Boston.

Nov. 12.— Frederic Tudor, Improvements in steam-heating; S. H. Woodbridge, Application of solar heat to the warming of buildings.

Appalachian mountain club, Boston.

Nov. 11.— William M. Davis, Mountain meteorology; Mr. E. B. Cook, Round Mountain; An excursion over Mounts Nancy, Anderson, and Lowell.

Anthropological society, Washington.

Nov. 3.— Otis T. Mason, Basket-making among the lower races; Wm. H. Holmes, The use of textiles in the decoration of pottery.

Publications received at Editor's Office, Nov. 2-7.

Allen, Grant. English worthies. Charles Darwin. Ed. by Andrew Lang. London, *Longmans*, 1885. 8+206 p. 12°. (New York, Scribner & Welford.)

Bary, A. de. Vorlesungen über bacterien. Leipzig, *Engelmann*, 1885. 6+146 p., illustr. 8°. (New York, Stechert, $1.10.)

Bastian. Afrika's osten mit dort eröffneten ausblicken. Heft i. Berlin, *Dümmler*, 1885. 64 p. 8°. (New York, Stechert, 45 cents.)

Baur, G. Note on the sternal apparatus in Iguanodon. (Leipzig, 1885.) 2 p. 8°.

Branche, L. Le chlorure de sodium et les eaux chlorurées sodiques eaux minérales et eaux de mer. Paris, *Baillière*, 1885. 295 p. 8°. (New York, Christern, $2.)

Circulating capital: being an inquiry into the fundamental laws of money. London, *Kegan Paul, Trench & Co.*, 1885. 8+410+44 p. 16°. (New York, Scribner & Welford.)

Cullerre, A. Magnétisme et hypnotisme. Paris, *Baillière*, 1886 [1885]. 8+381 p., illustr. 12°. (New York, Christern, $1.35.)

Delvaux, E. La verité sous la carte géologique de la Belgique, par un géologue. Bruxelles, *Gobbaerts pr.*, 1885. 16 p. 8°.

Doberck, W. Observations and researches made at the Hongkong observatory, 1884. Hongkong, *Noronha & Co., pr.*, 1885. 165 p. f°.

Fischer, B. Lehrbuch der chemie für pharmaceuten Hälfte ii. Stuttgart, *Enke*, 1886 [1885]. 14+[386] p., illustr. 8°. (New York, Stechert, $2.60.)

Geinitz, F. E. Uebersicht über die geologie Mecklenburgs. Güstrow, *Opitz*, 1885. 30 p., map. 4°.

Hess, W. Das süsswasseraquarium und seine bewohner. Stuttgart, *Enke*, 1886 [1885]. 4+255 p., illustr. 8°. (New York, Stechert, $2.20.)

Jungfleisch, E. Manipulations de chimie. Paris, *Baillière*, 1886 [1885]. 4+1240 p., illustr. 8°. (New York, Christern, $9.)

Kalkowsky, E. Elemente der lithologie. Heidelberg, *Winter*, 1886 [1885]. 8+316 p. 8°. (New York, Stechert, $3.)

Kittler, E. Handbuch der elektrotechnik. Band i., hälfte 1. Stuttgart, *Enke*, 1885. 296 p., illustr. 8°. (New York, Stechert, $3.30.)

Kobelt, W. Reiseerinnerungen aus Algerien und Tunis. Frankfurt-a.-M., *Diesterweg*, 1885. 8+480 p., figs. 8°. (10 marks.)

Lehmann, O. Physikalische technik speciell anleitung zur selbstanfertigung physikalischer apparate. Leipzig, *Engelmann*, 1885. 12+419 p., 17 pl., illustr. 8°. (New York, Stechert, $3.)

Mundt, W. Essays. Leipzig, *Engelmann*, 1885. 18+386 p., 8°. (New York, Stechert, $2.60.)

Noire, L. Logos ursprung und wesen der begriffe. Leipzig, *Engelmann*, 1885. 18+362 p., illustr. 8°. (New York, Stechert, $3.)

Schmarsow, A. Francisci Albertini opvscvlvm de mirabilibvs novae vrbis Romae. Heilbronn, *Henninger*, 1886 [1885]. 25+77 p. 12°. (New York, Stechert, $1.50.)

Struempell, L. Die einleitung in die philosophie vom standpunkte der geschichte der philosophie. Leipzig, *Böhme*, 1886 [1885]. 8+484 p. 8°. (New York, Stechert, $2.50.)

Thurston, R. H. A text-book of the materials of construction. New York, *Wiley*, 1885. 18+697 p., illustr. 8°.

Titcomb, S. E. Mind-cure on a material basis. Boston, *Cupples, Upham & Co.*, 1885. 288 p. 12°.

Trelease, W. Observations on several zoogloeae and related forms. (Baltimore, 1885. 24 p., 1 pl.) 8°.

Trolle, A. Das italienische volkstum und seine abhängigkeit von den naturbedingungen. Leipzig, *Duncker*, 1885. 12+147 p. 8°. (New York, Christern, $1.10.)

Trouvelot, E. L. Sur la structure intime de l'enveloppe solaire. Paris, *Gauthier-Villars, pr.*, 1885. 29 p., 1 pl. 8°.

—— Murs énigmatiques observés à la surface de la lune. Paris, *Gauthier-Villars*, 1885. 4 p. 8°.

—— Observation d'un essaim de corpuscules noirs passant devant le soleil. Paris, 1885. 3 p. 4°.

—— La planète Saturne en 1885. Paris, 1885. 4 p. 4°.

—— Remarquable protubérance solaire. Paris, 1885. 2 p. 4°.

—— Remarquables protubérances solaires diamétralement opposées. Paris, 1885. 3 p. 4°.

Uhland, W. H. Kalender für maschinen-ingenieure, jahrg. 12, 1886 Leipzig, *Baumgartner*, 1885. 4+281+19 p., map, illustr. 24°. (New York, Steiger, $1.10.)

Vambery, H. Das türkenvolk in seinen ethnologischen und ethnographischen beziehungen. Leipzig, *Brockhaus*, 1885. 12+638 p., 2 pl., illustr. 8° (New York, Westermann.)

Virchow, R. Bayern's untersuchungen über die ältesten gräber- und schatzfunde in Kaukasien. Berlin, *Asher*, 1885. 10+60 p., 16 pl., illustr. 8°. (New York, Steiger.)

Watt, W. Economic aspects of recent legislation. London, *Longmans, Green & Co.*, 1885. 20+167 p. 12°. (New York, Scribner & Welford.)

Wells, D. A. Practical economics. New York, *Putnam*, 1885. 8+259 p. 8°.

White, C. A. On new cretaceous fossils from California. Washington, *Government*, 1885. (Bull. U. S. geol. surv., 22.) 14 p., 5 pl. 8°.

Williams, S. G. Geological relations of the gypsum deposits in Cayuga county, N.Y. New Haven, *Amer. journ. sc.*, 1885. 8°.

Woeikof, A. Flüsse und landseen als produckte des klima's. Berlin, *Gesellsch. zu erdk.*, 1885. 18 p. 8°.

—— Temperaturänderungen mit der höhe in bergländern und in der freien atmosphäre. Berlin, *Meteorol. zeitschr.*, 1885. (18 p.) 8°.

Wood, J. G. Nature's teachings. Boston, *Roberts*, 1885. 10+533 p., illustr. 12°.

Zittel, K. A., **Schenk**, A., und **Scudder**, S. H. Handbuch der palaeontologie. Band i., abtheil. ii., lief. 4. München, *Oldenbourg*, 1885. [284] p., illustr. 8°. (New York, Christern, $2.95.)
